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(54) **Feeding unit**

Blattzuführeinheit

Unité d'alimentation de feuilles

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Description

[0001] The invention relates to a feeding unit according to the preamble of claim 1. Such a feeding unit having a forwarding mechanism in which belts are installed around a plurality of pulleys. More specifically, the invention relates to, for instance, a feeding unit for forwarding consumed stencil paper to a predetermined scrapping position in stencil printing machines and the like.

[0002] A rotary stencil printing machine has a cylindrical drum that is driven to rotate about a shaft center thereof. At least a part of the circumferential wall of the cylindrical drum is used as a printing region through which ink can pass. An ink supply means for supplying the ink into the inner surface of the circumferential wall is provided inside the cylindrical drum. A perforated stencil paper for performing the stencil printing is wound around the outer circumfernetial surface of the cylindrical drum. A printing sheet fed as the cylindrical drum rotates is pressed onto the cylindrical drum by pressing means arranged on the outer side of the cylindrical drum. The ink is introduced into the printing sheet through an image formed on the perforated stencil paper wound around the cylindrical drum, so that the stencil printing can be performed on the printing sheet.

[0003] The aforementioned stencil printing machine includes: a stencil discharging container that contains a consumed stencil paper; and a feeding unit that forwards the consumed stencil paper to the stencil discharging container. Some feeding units employ a feeding mechanism that includes pulleys and belts.

[0004] That is, a plurality of pulleys are pitched at a predetermined interval on each of two parallel running rotary shafts, and belts are installed around the pulleys of one rotary shaft and those of the other rotary shaft, respectively. The thus constructed feeding means are arranged so as to confront each other up and down. By rotating both feeding means in directions opposite to each other, a consumed stencil paper is fed while nipped by the belts of the upper and lower feeding means.

[0005] A conventional feeding unit employed in the stencil printing machine can forward a consumed stencil paper without any problem as long as the thickness of the stencil paper is uniform. If the consumed stencil paper is partially folded and has the folds bonded to each other by the ink, then the thickness of the stencil paper may, in some cases, becomes ununiform in a width direction that is orthogonal to a stencil paper forwarding direction. In such cases, the belts of the feeding unit do not come in contact with the thinner portion of the stencil paper adequately, which prevents the stencil paper from being forwarded in the correct condition, causing the stencil paper to jam along the forwarding path.

[0006] From prior art document EP-0-535 543 A2 a paper sheet conveying device is known. Said device comprises at least one pair of endless belts, at least two pulleys around which each of the endless belts extends, and a drive source for driving at least one of the pair of endless belts. According to one embodiment of said prior art device, one pair of endless belts have runs which oppose each other and which normally move in contact with each other. Said runs hold and convey a paper sheet supplied therebetween. One pulley of one endless belt is supported in a floating state for displacing the run of one belt away from the run of the other belt. For said displacing, a displacing means is provided which comprises a support arm for supporting a displaceable shaft carrying said one pulley. For urging said pulley and the related endless belt towards the opposing other one, a spring member is provided at said support arm accordingly. With said device, a single paper sheet can be conveyed as well as a stack of paper sheets by adapting the displacement of said one pulley in accordance with the height of said stack.

[0007] From prior art document GB 2 196 901 A a screen printing machine is known. Said screen printing machine comprises a feeding means for removing and disposing a used stencil. Within said feeding means a first pair of feeding rollers are arranged and abut each other. A second pair of rollers are arranged spaced laterally from said first mentioned rollers, wherein endless belts run around said first and second pair of rollers to connect a first roller with a second roller, respectively. Each of said rollers comprises a cylindrically-shaped outer surface extending perpendicular with regard to the feeding direction and being in contact with said used stencil during the removing process thereof. For removing the used stencil from a cylinder plate of the screen printing machine, the first pair of rollers is rotatably driven wherein one roller is urged against said plate cylinder by a suitable means. As a result, the used stencil paper having been wrapped around the plate cylinder is clamped at its leading end continuously peeled from the plate cylinder and transferred by the lower one of the endless belts in direction to a waste paper container. After completion of peeling off the used stencil paper from the plate cylinder, said one roller returns to its retracting position spaced apart from the plate cylinder.

[0008] It is an objective of the present invention to provide a feeding unit as indicated above wherein a proper and reliable feeding of a sheet-like element which may have a non-uniformed thickness is ensured.

[0009] According to the present invention this objective is solved by a feeding unit comprising: first feeding means including, a plurality of pulleys being arranged by pairs to confront one another, each having an axis and being rotatable around said axis, and a belt being installed around each pair of confronting pulleys, wherein a set is defined by said pair of confronting pulleys and each belt therearound, and a plurality of sets are provided and juxtaposed along the axial directions of said pulleys; second feedings means including, a plurality of pulleys being arranged by pairs to confront one another, each having an axis and being rotatable around said axis, and a belt being installed around each pair of con-

fronting pulleys, wherein a set is defined by said pair of confronting pulleys and each belt therearound, a plurality of sets are provided and juxtaposed along the axial directions of said pulleys; and support means for urging the respective pulleys belonging to at least a single pulley group, the single pulley group being defined by said pulleys arranged along a common axis in either one of said first feeding means and said second feeding means, toward confronting the other one of said first feeding means and said second feeding means, characterized in that said support means comprises support members for individually carrying one of the pulleys of said pulley group, respectively, to thereby urge pulleys of said pulley group with a predetermined force independently from the other pulleys belonging to the said same single pulley group, and the pulleys of said second feeding means are respectively located at positions that said pulleys cooperate with the respective pulleys of said first feeding means. Thus, a feeding unit is provided which is capable of forwarding a sheet-like body such as a stencil paper correctly even it the thickness of such a sheet-like body becomes non-uniform.

[0010] Preferably the support means includes: a plurality of support members for rotatably supporting a plurality of pulleys arranged along one of common axis; a plate member to which the support members are attached, the plate member having bending resiliency; a support portion for supporting the plate member so as to keep the bending resiliency of the plate member; and urging means for urging the plate member wherein the pulleys arranged along the one of the common axis come in contact with the corresponding pulleys belonging to the confronting feeding means.

[0011] Preferably a notch is formed at least at one of the positions, each position being between mounting portions of the support members.

[0012] At least the pulleys belonging to one group of pulleys in one of the feeding means are supported by the support means independently of one another and are urged towards the corresponding pulleys of the other feeding means. Even if the thickness of a screen printing stencil paper becomes ununiform across the width in the case of forwarding a screen printing stencil paper, the respective pulleys juxtaposed in the axial direction can nip the screen printing stencil paper with respect to the confronting pulleys under a uniform pressure. The single-sided contact of the screen printing stencil paper with the pulleys can be prevented, which in turn allows the screen printing stencil paper to be forwarded correctly.

[0013] Further preferred embodiments of the present invention are laid down in the respective dependent claims.

[0014] Hereinafter, the present invention is illustrated and explained in further detail by means of preferred embodiments in conjunction with the accompanying drawings. In the drawings wherein:

Fig. 1 is a side view of a first embodiment;
Fig. 2 is a partial view in a direction indicated by an arrow A in Fig. 1;
Fig. 3 is a partial view in a direction indicated by an arrow B in Fig. 2;
Fig. 4 shows lower second pulleys 30, a plate member 26, and support members as viewed in the direction indicated by the arrow B in Fig. 2;
Fig. 5 shows a first feeding means 10 as viewed in the direction indicated by the arrow A in Fig. 1; and
Fig. 6 is a partial view of a second embodiment.

[0015] A rotary stencil printing machine, which is a first embodiment, will now be described with reference to Figs. 1 to 5.

[0016] This rotary stencil printing machine includes a feeding unit as a feeding mechanism in the stencil discharging unit. The rotary stencil printing machine 1 has a cylindrical drum 2, which is cylindrical in shape. The cylindrical drum 2 is driven by drive means (not shown) and rotates in the counterclockwise direction about the central shaft line thereof as viewed in Fig. 1. A printing region through which ink passes and a non-printing region through which the ink does not pass are formed over the circumferential wall of the cylindrical drum 2. Within the cylindrical drum 2 is an ink supply means (not shown) that supplies the ink into the inner surface of the circumferential wall. A locking unit 3 is provided on the outer circumferential surface of the non-printing region on the cylindrical drum 2. The locking unit 3 holds the leading end of a screen printing stencil paper wound around the cylindrical drum 2.

[0017] As shown in Fig. 1, the stencil discharging unit 4 is arranged on the left side of the cylindrical drum 2. The stencil discharging unit 4 scraps the consumed stencil paper by peeling the stencil paper off the outer circumferential surface of the cylindrical drum 2. The stencil discharging unit 4 has a feeding unit 5 and a stencil discharging container 6 that contains the consumed stencil paper that is forwarded by the feeding unit 5.

[0018] The feeding unit 5 includes first and second feeding means 10, 20, each including a plurality of belts and a plurality of pulleys. As shown in Fig. 1, the first feeding means 10 is mounted on an opening/closing plate 7 arranged above the cylindrical drum 2. The opening/closing plate 7 serves as a cover body constituting the upper surface of a frame body (not shown) in the rotary stencil printing machine 1, and has the left end portion thereof not shown in Fig. 1 rotatably coupled to the frame body.

[0019] As shown in Fig. 1, a first upper rotary shaft 11 is rotatably arranged on the right end of the opening/closing plate 7. The first upper rotary shaft 11 runs in parallel with the central shaft line of the cylindrical drum 2. Four first upper pulleys 12 are pitched at a predetermined interval along the first upper rotary shaft 11.

[0020] A second upper rotary shaft 13 is rotatably arranged next to the first upper rotary shaft 11 in the con-

sumed stencil paper discharging direction (to the left as viewed in Fig. 1). The second upper rotary shaft 13 runs in parallel with the first upper rotary shaft 11. Four second upper pulleys 14 are pitched at a predetermined interval along the second upper rotary shaft 13. Each second upper pulley 14 has two rows of grooves, so that two belts can be installed.

[0021] Four third upper pulleys 15 are pitched at a predetermined interval next to the second upper rotary shaft 13 in the consumed stencil paper discharging direction (to the left as viewed in Fig. 1). The third upper pulleys 15 are mounted on a plurality of support plates 8 that are fixed to the opening/closing plate 7 so that the pulleys 15 can rotate about the shaft lines thereof. The respective shaft lines of the third upper pulleys 15 run in parallel with the first upper rotary shaft 11 and the second upper rotary shaft 13. It may be noted that the support plates 8 for rotatably supporting the third upper pulleys 15 are not shown in Fig. 2.

[0022] As shown in Figs. 1 and 2, belts 16 are installed around the third upper pulleys 15 and the second upper pulleys 14 whose positions in the axial direction correspond to each other, respectively. Belts 17 are installed around the second upper pulleys 14 and the first upper pulleys 12 whose positions in the axial direction correspond to each other, respectively. When the second upper rotary shaft 13 is driven, the first upper pulleys 12, the second upper pulleys 14, and the third upper pulleys 15 are rotated in the same direction, and so do the belts 16, 17 in the same direction in circulation. In Fig. 1, the respective pulleys 12, 14, 15 and the respective belts 16, 17 rotate in the clockwise direction.

[0023] As shown in Fig. 1, the second feeding means 20 is placed on a structural body (fixed portion) 9 of the rotary stencil printing machine 1 under the first feeding means 10. As shown in Fig. 3, a first lower rotary shaft 21 is rotatably arranged above the structural body 9. The first lower rotary shaft 21 runs in parallel with the second upper rotary shaft 13, and is arranged right under the second upper rotary shaft 13. Four first lower pulleys 22 are pitched at a predetermined interval along the first lower rotary shaft 21. The first lower pulleys 22 are positioned so as to nearly come in contact with the second upper pulleys 14, respectively.

[0024] As shown in Figs. 1, 2, and 5, two separating pawls 23 are arranged below the first lower rotary shaft 21. These two separating pawls 23 are fixed to the structural body 9, each having a wedgelike end which orients toward the top of the cylindrical drum 2. When the locking unit 3 is released, the leading end of the stencil paper wrapped around the cylindrical drum 2 becomes free. When the cylindrical drum 2 then rotates, the leading end of the stencil paper is guided to the two separating pawls 23 to be threaded between the first feeding means 10 and the second feeding means 20.

[0025] The first lower rotary shaft 21 is rotatably supported by a support member 40 that is fixed to a side plate 26c of the plate member 26 on the structural body 9. The structural body 9 is substantially L-shaped in cross-section and runs in parallel with the first lower rotary shaft 21. The structural body 9 is fixed to a main body (not shown) of the stencil printing machine. As shown in Figs. 1 to 3, four rodlike columns 24 are fixed at an interval on the upper surface of the structural body 9. A coil spring 25, which serves as an urging means, is fitted over each column 24. The plate member 26 is mounted onto the respective columns 24 through the corresponding coil springs 25.

[0026] As shown in Fig. 1, the plate member 26 is formed by bending an elongated thin plate at both widthwise edge portions at right angles along the length thereof; i.e., the plate member 26 includes a center plate 26b and two side plates 26a, 26c interposing the center plate 26b. The side plate 26a may be merely called the plate member in the description of the present invention. The center plate 26b of the plate member 26 has four holes at a predetermined interval. The columns 24 are inserted into the respective holes, so that the plate member 26 is supported by the coil springs 25. If a downwardly urging force is applied to the plate member 26, the plate member 26 receives an upwardly urging force by the resiliency of the coil springs 25. The center plate 26b and the columns 24 arranged on the structural body 9 serve as a support portion in the present invention.

[0027] As shown in Figs. 4, 5, three support members 27, 28 are fixed to the side plate 26a. The support member 27 in the middle has a base portion 27a and two support portions 27b, 27b projecting frontward from both sides of the base portion 27a. Each of the two support members 28, 28 on both sides has a base portion 28a and a support portion 28b projecting frontward continuous to the base portion 28a. As shown in Fig. 4, the side plate 26a has four notches 29 in the front surface thereof. Two notches 29 are arranged on both sides of the support member 27 in the middle and two notches 29 outside the support members 28, 28 on both sides.

[0028] As shown in Figs. 4, 5, second lower pulleys 30 are arranged one each to the respective support portion 27b, 28b of the support members 27, 28. The four second lower pulleys 30 are rotatably attached to the respective support portion 27b, 28b through independent rotary shafts. Although the rotary shafts of the four second lower pulleys 30 are independent of one another, the shaft lines thereof coincide with one another. The second lower pulleys 30 are in contact with the third upper pulleys 15 if nothing therebetween, respectively, and the respective coil springs 25 supporting the plate member 26 to which the second lower pulleys 30 are attached are in a pressed condition. Therefore, each second lower pulley 30 presses the corresponding third upper pulley 15 at a predetermined urging force by the resiliency of the corresponding coil spring 25. Further, each coil spring 25 also functions as causing the corresponding first lower pulley 22 to urge the corresponding second upper pulley 14.

[0029] The plate member 26 is made of a metal plate

that has a predetermined resiliency against bending, and the side plates 26a, 26c are resiliently deformable with respect to the center plate 26b around the bending edges thereof. Further, as described above, the notch 29 is formed at each portion of the side plate 26a between the two adjacent support members 27 and 28. Therefore, the three support members 27, 28 can be displaced independently of one another by recoverably deforming the portions of the side plate 26a defined by the respective notches 29 with respect to the center plate 26b. Hence, the four second lower pulleys 30 that are arranged on such support members 27, 28 can also move independently of one another. Since the two second lower pulleys 30, 30 in the middle are arranged on the common support member 27, the movements of both pulleys affect each other, but are not necessarily the same.

[0030] As shown in Fig. 5, the belts 31 are respectively installed around the first lower pulleys 22 and the second lower pulleys 30 whose positions in the axial direction correspond to each other. Each belt 31 moves endlessly across the plate member 26 and the corresponding notch 29. When the first lower rotary shaft 21 is driven, the first lower pulleys 22, the second lower pulleys 30, and the belts 31 rotate in the same direction. In Fig. 1, each of the pulleys 22, 30 and each belt 31 rotate in the counterclockwise direction.

[0031] Next to the feeding unit 5 is the stencil discharging container 6 that contains consumed stencil paper. The third upper pulleys 15 and the second lower pulleys 30 are arranged to face the entrance of the stencil discharging container 6.

[0032] The operation of the thus constructed rotary stencil printing machine at the time of discharging the consumed stencil paper will be described. Upon end of printing, the locking unit 3 is released. The leading end T of the perforated stencil paper for stencil printing wound around the cylindrical drum 2 is freed as shown by the one dot chain line in Fig. 1. The first feeding means 10 and the second feeding means 20 are driven, and the cylindrical drum 2 is rotated. The leading end of the stencil paper is introduced between the first feeding means 10 and the second feeding means 20 while guided by the two separating pawls 23. When the leading end of the stencil paper has come in contact with the belts 17 between the first upper pulleys 12 of the first feeding means 10 and the second upper pulleys 14 of the first feeding means 10, the leading end of the stencil paper is guided along the belts 17 to be introduced between the first feeding means 10 and the second feeding means 20. The stencil paper is forwarded towards the stencil discharging container 6 while nipped between the belts 16 of the first feeding means 10 and the belts 31 of the second feeding means 20.

[0033] The second lower pulleys 30 of the second feeding means 20 are supported by the support means 27, 28 so as to be movable independently of one another within a resilient deformable range. Further, each second lower pulley 30 is in contact with the corresponding third upper pulley 15 of the first feeding means 10 with a predetermined force. Even if the thickness of the stencil paper that is being forwarded becomes ununiform across the width, the four second lower pulleys 30 can be moved independently of one another by accommodating the fluctuations in the thickness of the stencil paper, which in turn allows the second lower pulleys 30 to nip the stencil paper at a uniform pressure together with the third upper pulleys 15 that confront the second lower pulleys 30. Therefore, the one-sided contact of the stencil paper with the belts 16, 31 can be prevented, which in turn allows the stencil paper to be forwarded correctly.

[0034] Fig. 6 is a partial view of a second embodiment.

[0035] Parts that are not shown in the drawing are the same as those of the first embodiment. The second embodiment is distinguished from the first embodiment in the structure for supporting the second lower pulleys 30. A base end portion of a plate member 36 having bending resiliency is fixed to the structural body 9. The support members 27, 28 are fixed to the front end portion of the plate member 36 which serves as a free end. The second lower pulleys 30 are rotatably attached to the support members 27, 28. Between the front end portion of the plate member 36 and the structural body 9 are coil springs 35, each of which serves as an urging means. Each coil spring 35 urges the front end portion of the cantilevered plate member 36 upward, so that the second lower pulleys 30 urges the third upper pulleys 15 upward with a predetermined force. The second embodiment can provide the same operation and advantages as the first embodiment.

[0036] In the aforementioned embodiments, the second lower pulleys 30 are supported independently of one another with the plate members 26, 36 or the like that have bending resiliency, and the second lower pulleys 30 are brought into contact with the third upper pulleys 15 with the coil springs 25, 35. By supporting the other pulleys in a structure similar to that for the second lower pulleys 30, fluctuations in the thickness of the stencil paper that is being forwarded can be accommodated with further flexibility.

[0037] The aforementioned embodiments relate to the stencil paper feeding unit for the stencil discharging unit. However, the feeding unit is not applied only to the forwarding of the consumed stencil paper, but is, of course, applicable to sheetlike bodies to be forwarded including printing paper. In a printing paper feeding unit for a printing apparatus, in particular, one may, in some cases, encounter inconveniences such as the diverting of the sheet forward direction with a one-sided forwarding force applied to a sheet or the jamming of the sheet along a forwarding path when the sheet that is narrower than the width of the feeding unit is to be forwarded. According to the feeding unit, the sheet can be forwarded correctly even if such sheet whose width is smaller than that of the forward unit is forwarded.

[0038] According to the feeding unit, a work to be for-

warded can be forwarded correctly even if the thickness of the work to be forwarded becomes ununiform across the width, which in turn contributes to avoiding such inconvenience as jamming the work to be forwarded along a forwarding path.

Claims

1. A feeding unit comprising:

first feeding means including,

a plurality of pulleys (14,15) being arranged by pairs to confront one another, each having an axis and being rotatable around said axis, and
a belt (16) being installed around each pair of confronting pulleys (14,15),
wherein a set is defined by said pair of confronting pulleys (14,15) and each belt (16) therearound, and a plurality of sets are provided and juxtaposed along the axial directions of said pulleys (14,15);

second feedings means including,

a plurality of pulleys (22,30) being arranged by pairs to confront one another, each having an axis and being rotatable around said axis, and
a belt (31) being installed around each pair of confronting pulleys (22,30),
wherein a set is defined by said pair of confronting pulleys (22,30) and each belt (31) therearound, a plurality of sets are provided and juxtaposed along the axial directions of said pulleys (22,30); and

support means for urging the respective pulleys (30) belonging to at least a single pulley group, the single pulley group being defined by said pulleys (30) arranged along a common axis in either one of said first feeding means and said second feeding means, toward confronting the other one of said first feeding means and said second feeding means,

characterized in that
said support means comprises support members (28) for individually carrying one of the pulleys (30) of said pulley group, respectively, to thereby urge pulleys (30) of said pulley group with a predetermined force independently from the other pulleys (30) belonging to the said same single pulley group, and the pulleys (22,30) of said second feeding means are respectively located at positions that said pulleys (22,30) cooperate with the respective pulleys (14,15) of said first feeding means.

2. A feeding unit according to claim 1, wherein said support means includes:

a plurality of support members (27,28) for rotatably supporting a plurality of pulleys arranged along one of common axis;
a plate member (26) to which said support members are attached, said plate member having bending resiliency;
a support portion (24) for supporting said plate member (26) so as to keep the bending resiliency of said plate member; and
urging means (25) for urging said plate member wherein said pulleys (30) arranged along said one of the common axis come in contact with said corresponding pulleys (15) belonging to the confronting feeding means.

3. A feeding unit according to claim 2, wherein a notch (29) is formed at least at one position, each position of said plate member (26) being between mounting portions of said support members (27,28).

4. A feeding unit according to one of claims 1 to 3, wherein said first feeding means comprises:

a first-pulley shaft (13);
first pulleys (14) secured on said first-pulley shaft;
second pulleys (15) having a common axis paralleling said first-pulley shaft (13), said second pulleys being positioned downstream with respect to said first pulleys;
mounting members on which said respective second pulleys (15) are rotatably mounted;

wherein said belts (16) of said first feeding means are installed between said respective first pulleys (14) and said respective second pulleys (15);
wherein said second feeding means comprises:

a third-pulley shaft (21) paralleling the first-pulley shaft (13) of the first feeding means, said third-pulley shaft (21) of the second feeding means being positioned opposite to the first-pulley shaft (13) of said first feeding means with respect to the work;
third pulleys (22) secured on said third-pulley shaft (21), said third pulleys (22) being confronting said respective first pulleys (14) of the first feeding means;
fourth pulleys (30) having a common axis paralleling said third-pulley shaft (21), said fourth pulleys (30) being positioned downstream with respect to said third pulleys (22) and being confronting said respective second pulleys (15) of

said first feeding means;

wherein said belts (31) of said second feeding means are installed between said respective third pulleys (22) and said respective fourth pulleys (30) of said second feeding means; and
wherein said support member (28) on which said fourth pulleys (30) of said second feeding means are rotatably mounted individually urges said fourth pulleys (30) toward the second pulleys (15) of the first feeding means.

5. A feeding unit according to claim 4, wherein said support member includes:

a plate member (26;36) to which fourth pulley (30) support members are attached, said plate member having bending resiliency;
a support portion (24) supporting said plate member with keeping the bending resiliency of said plate member; and
a spring (25;35) urging said plate member.

6. A feeding unit according to claim 5, wherein said plate member (26) has a notch (29) between positions where said fourth pulley (30) support members are attached.

7. A feeding unit according to claim 5 or 6, wherein each of said fourth pulley (30) support members (28) is movable individually from the other fourth pulley (30) support members by deforming said plate member (26;36).

8. A feeding unit according to claim 5, 6 or 7, wherein said plate member (26;36) and said support portion are made of a metal plate.

9. A feeding unit according to one of claims 5 to 8, wherein said fourth pulley (30) support members (28) are attached to extend from said plate member (36) toward downstream.

10. A feeding unit according to one of claims 5 to 9, wherein said support member (28) further includes a column under said support portion, and said spring of said support member is a coil spring (35) wound around said column.

Patentansprüche

1. Zuführeinheit, die umfasst:

eine erste Zuführeinrichtung, die enthält:

eine Vielzahl von Riemenscheiben (14, 15), die paarweise einander gegenüberliegend angeordnet sind, wobei jede eine Achse hat und um die Achse herum gedreht werden kann, sowie

einen Riemen (16), der um jedes Paar einander gegenüberliegender Riemenscheiben (14, 15) herum installiert ist, wobei eine Gruppe durch das Paar einander gegenüberliegender Riemenscheiben (14, 15) und jeden Riemen (16) darum herum gebildet wird und eine Vielzahl von Gruppen vorhanden und in der axialen Richtung der Riemenscheiben (14, 15) nebeneinander angeordnet sind;

eine zweite Zuführeinrichtung, die enthält:

eine Vielzahl von Riemenscheiben (22, 30), die paarweise einander gegenüberliegend angeordnet sind, wobei jede eine Achse hat und um die Achse herum gedreht werden kann, sowie

einen Riemen (31), der um jedes Paar einander gegenüberliegender Riemenscheiben (22, 30) herum installiert ist, wobei eine Gruppe durch das Paar einander gegenüberliegender Riemenscheiben (22, 30) und jeden Riemen (31) darum herum gebildet wird und eine Vielzahl von Gruppen vorhanden und in der axialen Richtung der Riemenscheiben (22, 30) und nebeneinander angeordnet sind; und

eine Trageeinrichtung, die die entsprechenden Riemenscheiben (30), die zu wenigstens einer einzelnen Riemenscheibengruppe gehören, wobei die einzelne Riemenscheibengruppe durch die Riemenscheiben (30) gebildet wird, die auf einer gemeinsamen Achse in der ersten Zuführeinrichtung oder der zweiten Zuführeinrichtung angeordnet sind, auf die gegenüberliegende andere, d.h. die erste Zuführeinrichtung oder die zweite Zuführeinrichtung, zu drückt,

dadurch gekennzeichnet, dass
die Trageeinrichtung Trageelemente (28) umfasst, die jeweils einzeln eine der Riemenscheiben (30) der Riemenscheibengruppe tragen, um so unabhängig von den anderen Riemenscheiben (30), die zu der gleichen einzelnen Riemenscheibengruppe gehören, mit einer vorgegebenen Kraft auf Riemenscheiben (30) der Riemenscheibengruppe zu drük-

ken, und die Riemenscheiben (22. 30) der zweiten Zuführeinrichtung jeweils an Positionen angeordnet sind, an denen die Riemenscheiben (22, 30) mit den entsprechenden Riemenscheiben (14, 15) der ersten Zuführeinrichtung zusammenwirken.

2. Zuführeinheit nach Anspruch 1, wobei die Trageeinrichtung enthält:

eine Vielzahl von Trageelementen (27, 28), die eine Vielzahl von Riemenscheiben, die auf einer der gemeinsamen Achsen angeordnet sind, drehbar tragen;

ein Plattenelement (26), an dem die Trageelemente angebracht sind, wobei das Plattenelement Biegeelastizität aufweist;

einen Trageabschnitt (24), der das Plattenelement (26) so trägt, dass die Biegeelastizität des Plattenelementes beibehalten wird; sowie

eine Drückeinrichtung (25), die auf das Plattenelement drückt, wobei die Riemenscheiben (30), die auf der einen der gemeinsamen Achsen angeordnet sind, in Kontakt mit den entsprechenden Riemenscheiben (15) kommen, die zu der gegenüberliegenden Zuführeinrichtung gehören.

3. Zuführeinheit nach Anspruch 2, wobei eine Einkerbung (29) an wenigstens einer Position ausgebildet ist und wobei jede Position des Plattenelementes (26) zwischen Anbringungsabschnitten der Trageelemente (27, 28) liegt.

4. Zuführeinheit nach einem der Ansprüche 1 bis 3, wobei die erste Zuführeinrichtung umfasst:

eine Welle (13) für erste Riemenscheiben;

erste Riemenscheiben (14), die auf der Welle für erste Riemenscheiben befestigt sind;

zweite Riemenscheiben (15), die eine gemeinsame Achse haben, die parallel zu der Welle (13) für erste Riemenscheiben ist, wobei die zweiten Riemenscheiben in Bezug auf die ersten Riemenscheiben stromab angeordnet sind;

Anbringungselemente, an denen die entsprechenden zweiten Riemenscheiben (15) drehbar angebracht sind;

wobei die Riemen (16) der ersten Zuführeinrichtung zwischen den entsprechenden ersten Riemenscheiben (14) und den entsprechenden zweiten Riemenscheiben (15) installiert sind;
wobei die zweite Zuführeinrichtung umfasst:

eine Welle (21) für dritte Riemenscheiben, die parallel zu der Welle (13) für erste Riemenscheiben der ersten Zuführeinrichtung ist, wobei die Welle (21) für dritte Riemenscheiben der zweiten Zuführeinrichtung in Bezug auf das Erzeugnis gegenüber der Welle (13) für erste Riemenscheiben der ersten Zuführeinrichtung angeordnet ist;

dritte Riemenscheiben (22), die auf der Welle (21) für dritte Riemenscheiben befestigt sind, wobei die dritten Riemenscheiben (22) den entsprechenden ersten Riemenscheiben (14) der ersten Zuführeinrichtung gegenüberliegen;

vierte Riemenscheiben (30) mit einer gemeinsamen Achse, die parallel zu der Welle (21) für dritte Riemenscheiben ist, wobei die vierten Riemenscheiben (30) in Bezug auf die dritten Riemenscheiben (22) stromab angeordnet sind und den entsprechenden zweiten Riemenscheiben (15) der ersten Zuführeinrichtung gegenüber liegen;

wobei die Riemen (31) der zweiten Zuführeinrichtung zwischen den entsprechenden dritten Riemenscheiben (22) und den entsprechenden vierten Riemenscheiben (30) der zweiten Zuführeinrichtung installiert sind; und
wobei das Trageelement (28), auf dem die vierten Riemenscheiben (30) der zweiten Zuführeinrichtung drehbar angebracht sind, die vierten Riemenscheiben (30) einzeln auf die zweiten Riemenscheiben (15) der ersten Zuführeinrichtung zu drückt.

5. Zuführeinheit nach Anspruch 4, wobei das Trageelement enthält:

ein Plattenelement (26; 36), an dem Trageelemente der vierten Riemenscheiben (30) angebracht sind, wobei das Plattenelement Biegeelastizität aufweist;

einen Trageabschnitt (24), der das Plattenelement trägt und dabei die Biegeelastizität des Plattenelementes beibehält; und

eine Feder (25; 35), die auf das Plattenelement drückt.

6. Zuführeinheit nach Anspruch 5, wobei das Plattenelement (26) eine Einkerbung (29) zwischen Positionen aufweist, an denen die Trageelemente der vierten Riemenscheiben (30) angebracht sind.

7. Zuführeinheit nach Anspruch 5 oder 6, wobei jedes der Trageelemente (28) der vierten Riemenscheibe (30) unabhängig von den anderen Trageelementen der vierten Riemenscheiben (30) bewegt werden kann, indem das Plattenelement (26; 36) verformt wird.

8. Zuführeinheit nach Anspruch 5, 6 oder 7, wobei das Plattenelement (26; 36) und der Trageabschnitt aus einer Metallplatte bestehen.

9. Zuführeinheit nach einem der Ansprüche 5 bis 8, wobei die Trageelemente (28) der vierten Riemenscheibe (30) so angebracht sind, dass sie sich von dem Plattenelement (31) stromab erstrecken.

10. Zuführeinheit nach einem der Ansprüche 5 bis 9, wobei das Trageelement (28) des Weiteren eine Säule unter dem Trageabschnitt enthält, und die Feder des Trageelementes eine Schraubenfeder (35) ist, die um die Säule herum gewunden ist.

Revendications

1. Unité d'alimentation, comprenant :

un premier dispositif d'alimentation comprenant

plusieurs poulies (14, 15) placées par paires en regard les unes des autres, chacune ayant un axe et pouvant tourner autour de cet axe, et
une courroie (16) placée autour de chaque paire de poulies en regard (14, 15),
dans lequel un ensemble est défini par la paire de poulies en regard (14, 15) et chaque courroie (16) qui passe autour d'elles, et plusieurs ensembles sont incorporés et juxtaposés dans la direction axiale des poulies (14, 15),

un second dispositif d'alimentation comprenant

plusieurs poulies (22, 30) placées par paires en regard les unes des autres, chacune ayant un axe et pouvant autour de cet axe, et
une courroie (31) disposée autour de chaque paire de poulies en regard (22, 30),
dans lequel un ensemble est défini par la paire de poulies en regard (22, 30) et chaque courroie (31) passant autour d'elles, plusieurs ensembles étant disposés et juxtaposés dans la direction axiale des poulies (22, 30), et
un dispositif de support destiné à rappeler les poulies respectives (30) appartenant à au moins un groupe unique de poulies, le groupe unique de poulies étant défini par les poulies (30) disposées le long d'un axe commun dans l'un des premier et second dispositifs d'alimentation, vers l'autre des premier et second dispositifs d'alimentation placés en regard,

caractérisée en ce que

le dispositif de support comporte des organes de support (28) destinés à supporter individuellement l'une des poulies (30) du groupe de poulies respectivement afin que les poulies (30) du groupe de poulies soient poussées avec une force prédéterminée indépendamment des autres poulies (30) appartenant au même groupe unique de poulies, et les poulies (22, 30) du second dispositif d'alimentation sont disposées respectivement à des positions telles que les poulies (22, 30) coopèrent avec les poulies respectives (14, 15) du premier dispositif d'alimentation.

2. Unité d'alimentation selon la revendication 1, dans laquelle le dispositif de support comprend :

plusieurs organes de support (27, 28) destinés à supporter de manière rotative plusieurs poulies disposées le long d'un axe commun,
un organe à plaque (26) auquel sont fixés les organes de support, l'organe à plaque ayant une élasticité à la flexion,
une partie de support (24) destinée à supporter l'organe à plaque (26) afin que l'élasticité à la flexion de l'organe à plaque soit conservée, et
un dispositif de rappel (25) destiné à rappeler l'organe à plaque, les poulies (30) placées le long dudit axe commun venant au contact des poulies correspondantes (15) appartenant au dispositif d'alimentation placé en regard.

3. Unité d'alimentation selon la revendication 2, dans laquelle une encoche (29) est formée à au moins une position, chaque position de l'organe à plaque (26) étant comprise entre des parties de montage des organes de support (27, 28).

4. Unité d'alimentation selon l'une des revendications 1 à 3,

dans laquelle le premier dispositif d'alimentation comprend :

un premier arbre à poulie (13),
des premières poulies (14) fixées au premier arbre à poulie,
des secondes poulies (15) ayant un axe commun parallèle au premier arbre à poulie (13), les secondes poulies étant disposées en aval

des premières poulies, et
des organes de montage sur lesquels sont montées les secondes poulies respectives (15) afin qu'elles puissent tourner,

dans lequel les courroies (16) du premier dispositif d'alimentation sont disposées entre les premières poulies respectives (14) et les secondes poulies respectives (15),

dans lequel le second dispositif d'alimentation comprend :

un troisième arbre à poulies (21) parallèle au premier arbre à poulies (13) du premier dispositif d'alimentation, le troisième arbre à poulies (21) du second dispositif d'alimentation étant positionné en face du premier arbre à poulies (13) du premier dispositif d'alimentation par rapport à un élément,
des troisièmes poulies (22) fixées au troisième arbre à poulies (21), les troisièmes poulies (22) étant placées en face des premières poulies respectives (14) du premier dispositif d'alimentation, et
des quatrièmes poulies (30) ayant un axe commun parallèle au troisième arbre à poulies (21), les quatrièmes poulies (30) étant positionnées en aval des troisièmes poulies (22) et étant en regard des secondes poulies respectives (15) du premier dispositif d'alimentation,

dans lequel les courroies (31) du second dispositif d'alimentation sont disposées entre les troisièmes poulies respectives (22) et les quatrièmes poulies respectives (30) du second d'alimentation, et

dans lequel l'organe de support (28) sur lequel sont montées individuellement les quatrièmes poulies (30) du second dispositif d'alimentation afin qu'elles tournent rappellent les quatrièmes poulies (30) vers les secondes poulies (15) du premier dispositif d'alimentation.

5. Unité d'alimentation selon la revendication 4, dans laquelle l'organe de support comprend :

un organe à plaque (26 ; 36) auquel sont fixés des organes de support de quatrièmes poulies (30), l'organe à plaque ayant une élasticité à la flexion,
une partie de support (24) destinée à supporter l'organe à plaque en conservant l'élasticité à la flexion de l'organe à plaque, et
un ressort (25 ; 35) rappelant l'organe à plaque.

6. Unité d'alimentation selon la revendication 5, dans laquelle l'organe à plaque (26) a une encoche (29) disposée entre des positions auxquelles les organes de support de quatrièmes poulies (30) sont fixés.

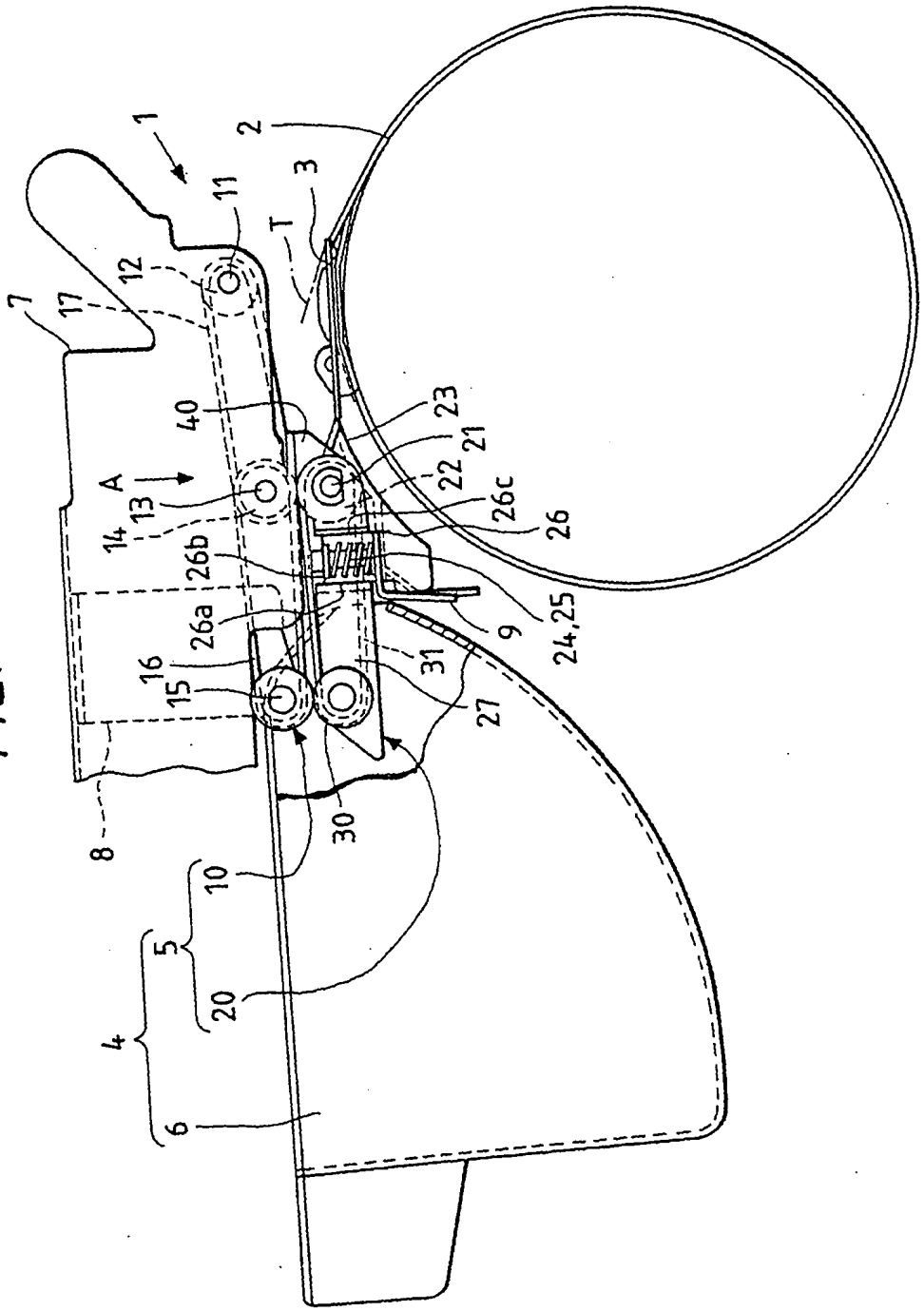
7. Unité d'alimentation selon la revendication 5 ou 6; dans laquelle chacun des organes de support (28) de quatrièmes poulies (30) est mobile individuellement par rapport aux autres organes de support de quatrièmes poulies (30) par déformation de l'organe à plaque (26 ; 26).

8. Unité d'alimentation selon la revendication 5, 6 ou 7, dans laquelle l'organe à plaque (26 ; 36) et la partie de support sont formés d'une plaque métallique.

9. Unité d'alimentation selon l'une des revendications 5 à 8, dans laquelle les organes de support (28) des quatrièmes poulies (30) sont fixés afin qu'ils s'étendent depuis l'organe à plaque (36) vers l'aval.

10. Unité d'alimentation selon l'une des revendications 5 à 9, dans laquelle l'organe de support (28) comporte en outre une colonne placée sous la partie de support, et le ressort de l'organe de support est un ressort hélicoïdal (35) enroulé autour de la colonne.

FIG. 1


1
2
3
T
11
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17
7
40
A
13
14
26b
26a
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26c
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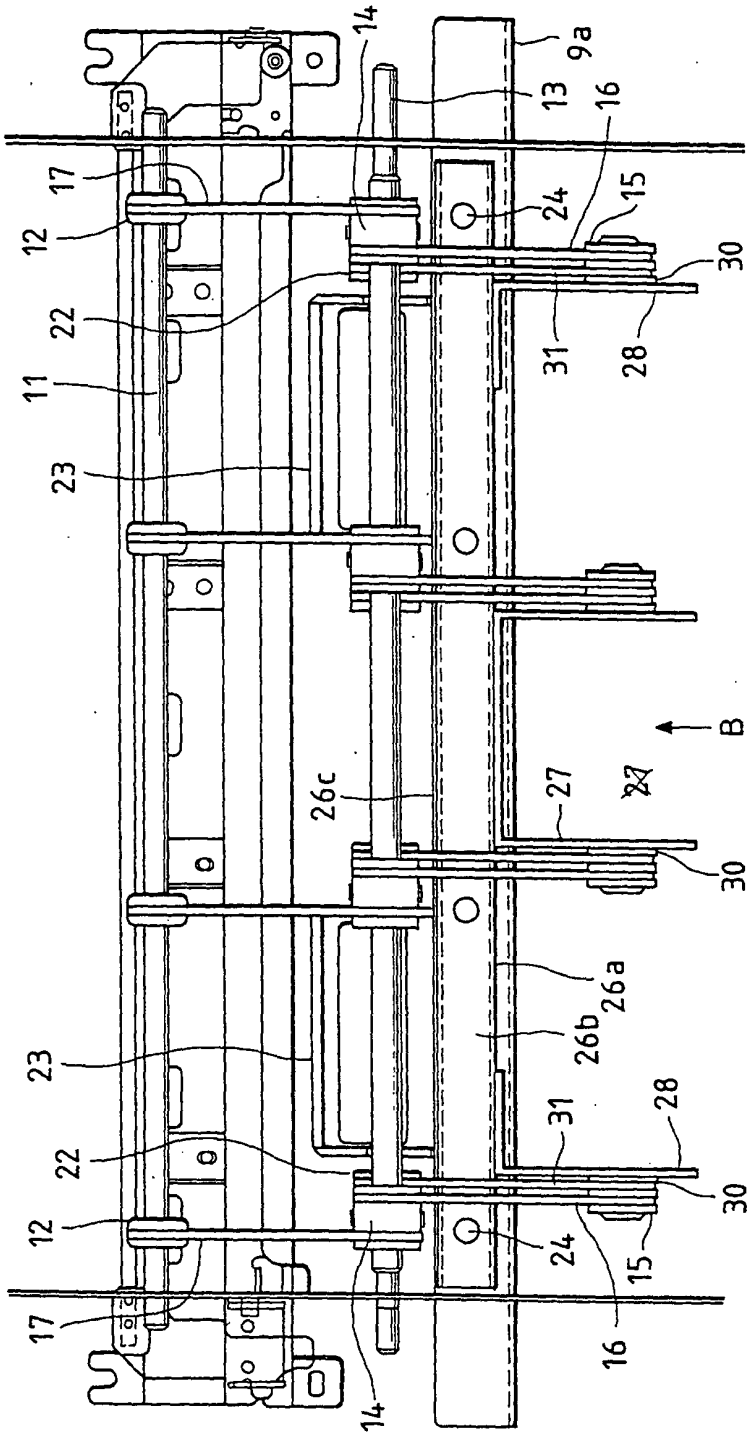
9
24,25
31
27

FIG. 2


14
9a
13
16
17
24
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30
22
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23
B
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26b
23
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28
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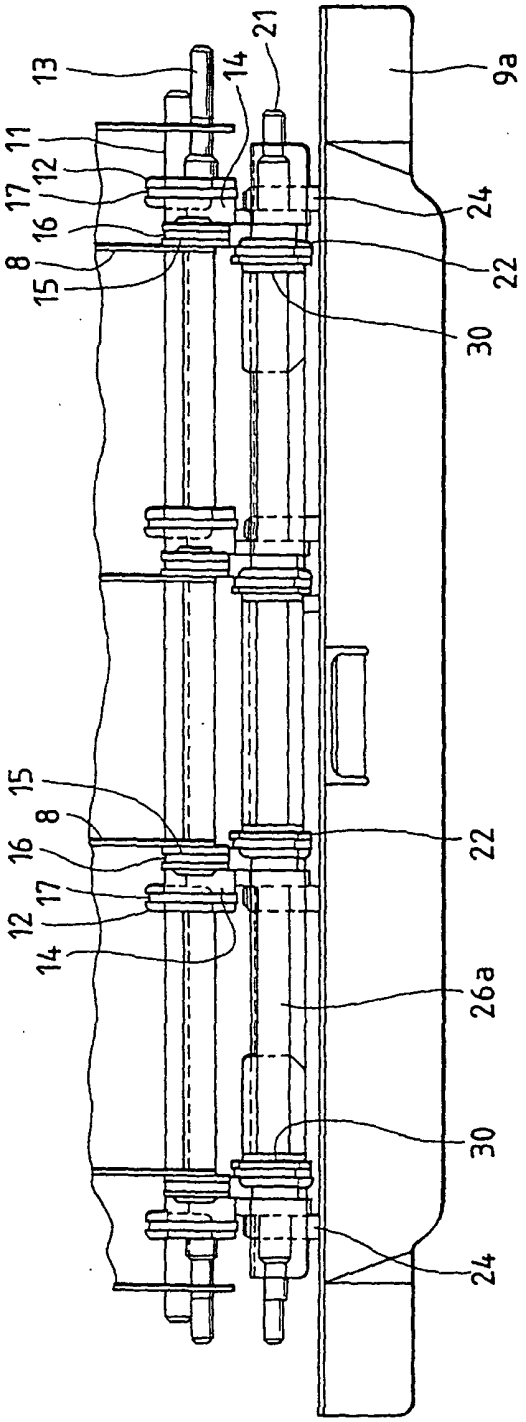
16
14

FIG. 3


13
14
21
9a
11
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17
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15
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30
15
8
16
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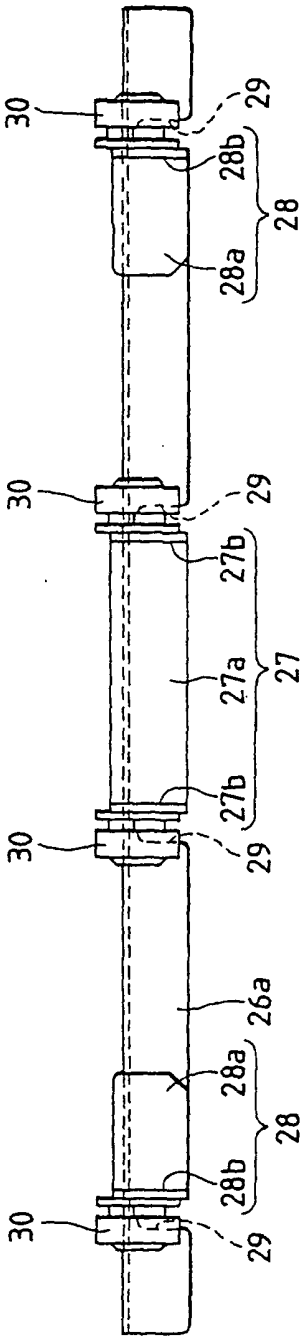
22
26a
30
24

FIG. 4


30
29
28b
28
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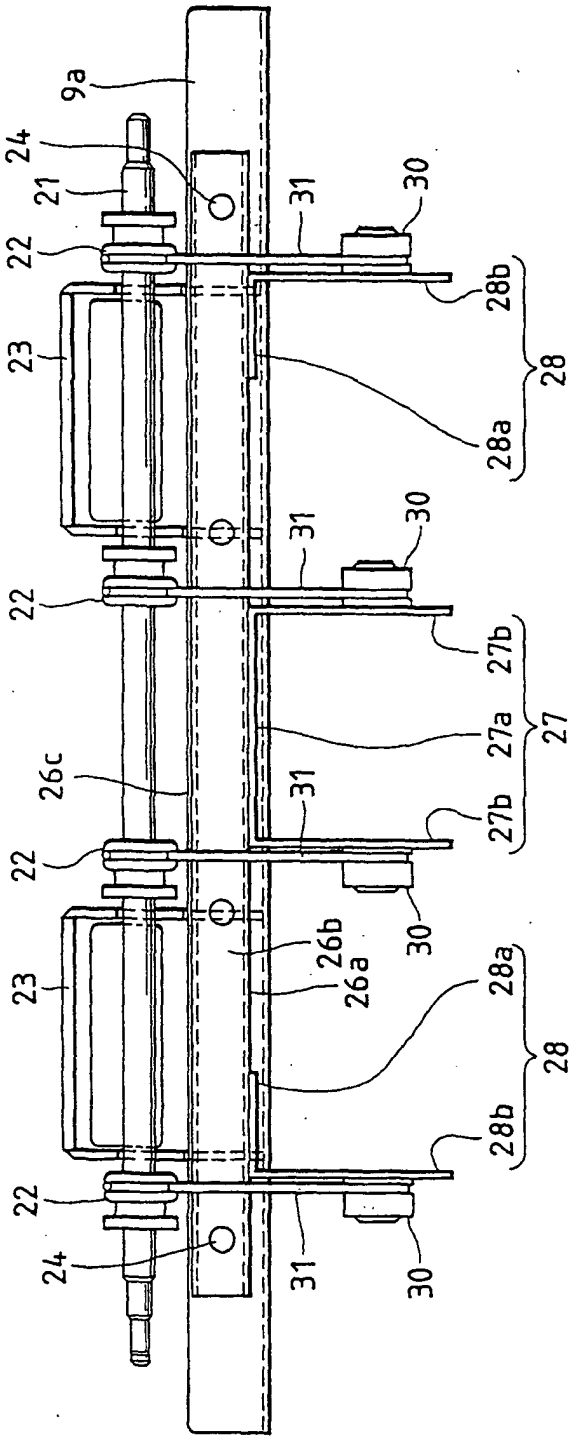
29
27b
27
27a
27b
30
29
26a
28a
28
28b
30
29

FIG. 5


9a
24
21
22
23
22
26c
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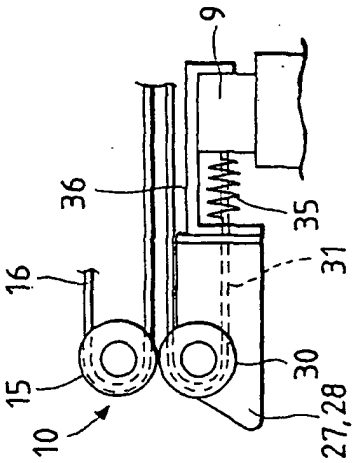
23
26b
26a
22
24
31
30
28b
28a
28
27b
27a
27
28

FIG. 6


9
36
35
16
31
15
30
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27,28